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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/798,519
Filing Date: March 11, 2004
Appellant(s): SIEVERS ET AL.

Billy C. Allen III (Reg. No. 46,147)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/09/2009 appealing from the Office action mailed 11/14/2008.

(1) Real Party In Interest

The real party in interest is Polycom, Inc.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 7,114,174 B1	Brooks et al.	09-2006
US 2005/0041740 A1	Sekiguchi et al.	02-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 22-27 and 30-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Brooks et al. (US 7114174 B1).

Re **claim 22**, Brooks discloses a method of quality-improvement of a digitally-encoded video sequence, the method comprising: determining one or more processing capabilities of a decoder that will decode the video sequence (Brooks: Figs. 6A and 6B; column 10, lines 1-15); and increasing video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused (Brooks: Fig. 6A; column 3, lines 8-14).

Re **claim 23**, Brooks discloses that the step of determining one or more processing capabilities of a decoder comprises having prior knowledge of the decoder type (Brooks: column 10, lines 1-15, the data associated with the output video data is typically derived from the requesting device, and the requesting device will inform the gateway system as to the bandwidth requirements, whereas such requirements may include maximum frame rate, color-depth, screen resolution or spatial bandwidth, maximum bit rate, and the like).

Re **claim 24**, Brooks discloses that the step of determining one or more processing capabilities of the decoder comprises receiving processing capability information from the decoder (Brooks: column 3, lines 12-14, adaptation is made with respect to encoding format).

Re **claim 25**, Brooks discloses that the step of increasing video quality comprises increasing a video frame rate (Brooks: Fig. 6A, element 890).

Re **claim 26**, Brooks discloses that the step of increasing video quality comprises increasing a video picture size (Brooks: Fig. 6A, element 860).

Re **claim 27**, Brooks discloses a video encoder for generating an encoded video sequence, comprising: one or more image processing engines adapted to: encode a video signal (Brooks: Fig. 4,

encoder 560); determine one or more processing capabilities of a decoder that will decode the encoded video sequence (Brooks: Figs. 6A and 6B; column 10, lines 1-15); and increase video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused (Brooks: Fig. 6A; column 3, lines 8-14).

Claim 30 has been analyzed and rejected with respect to claim 25 above.

Claim 31 has been analyzed and rejected with respect to claim 26 above.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-21, 28-29, and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brooks et al. (US 7114174 B1) in view of Sekiguchi et al. (US 20050041740 A1).

Re **claim 1**, Brooks discloses a method of quality-improvement of a digitally-encoded video sequence, wherein the video sequence comprises information representing a sequence of encoded frames, each encoded frame comprising one or more encoded macroblocks, the method comprising: determining one or more processing capabilities of a decoder that will decode the video sequence (Brooks: Fig. 6A, elements 810, 840, and 870; the video stream is manipulated to meet a target output color depth, resolution, and frame rate); encoding macroblocks of a first image (Brooks: Fig. 6B, element 930; the data is encoded); and adjusting video quality to meet target output parameters (Brooks: Fig. 6A; column 3, lines 8-14).

Brooks does not specifically disclose encoding macroblocks of subsequent images, wherein some macroblocks are skipped and determining a target video quality for the output stream as a function of a fraction of macroblocks that are skipped. However, Sekiguchi discloses a video data conversion

method, where some macroblocks are skipped in the encoding process (Sekiguchi: Fig. 2, element ST0) and the coding mode is determined by analyzing a cost function if the frame is a mix of skipped blocks and non-skipped blocks (Sekiguchi: Fig. 7, coding mode estimator 8; paragraphs [0127]-[0130]). Since both Brooks and Sekiguchi relate to manipulating video data to meet output stream constraints, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the video data conversion of Sekiguchi with the quality manipulation of Brooks in order to provide a more robust encoder, which can hold up to the change in data used for motion estimation, which results from the change in resolution (Sekiguchi: paragraph [0010]). The combined method of Brooks and Sekiguchi has all of the features of claim 1.

Re **claim 2**, the combined method of Brooks and Sekiguchi discloses that the step of determining one or more processing capabilities of a decoder comprises having prior knowledge of the decoder type (Brooks: column 10, lines 1-15, the data associated with the output video data is typically derived from the requesting device, and the requesting device will inform the gateway system as to the bandwidth requirements, whereas such requirements may include maximum frame rate, color-depth, screen resolution or spatial bandwidth, maximum bit rate, and the like).

Re **claim 3**, the combined method of Brooks and Sekiguchi discloses that the step of determining one or more processing capabilities of the decoder comprises receiving processing capability information from the decoder (Brooks: column 3, lines 12-14, adaptation is made with respect to encoding format).

Re **claim 4**, the combined method of Brooks and Sekiguchi discloses a majority of the features of claim 4, as discussed above in claim 1. Brooks does not explicitly disclose that the step of determining one or more processing capabilities of the decoder comprises determining the number of macroblocks that can be decoded in a given interval if all macroblocks are skipped. However, Sekiguchi discloses a video data conversion device and method, wherein macroblocks conform to one of several coding modes (Sekiguchi: paragraph [0129], intra, skip, and inter modes) and the coding mode is selected based on a cost function (Sekiguchi: Fig. 7; paragraphs [0127]-[0130]). If an occasion other than skip takes place just once, then the possibility of inter mode is checked (Sekiguchi: paragraph [0128]) and the optimum mode in terms of the coding efficiency is redecided among the possible coding modes (Sekiguchi: paragraph

[0130]), thus resulting in highest coding efficiency being selected (Sekiguchi: paragraph [0140]). Since both Brooks and Sekiguchi relate to manipulating video data to meet output stream constraints, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the video data conversion of Sekiguchi with the quality manipulation of Brooks in order to provide a more robust encoder, which can hold up to the change in data used for motion estimation, which results from the change in resolution (Sekiguchi: paragraph [0010]).

Re **claim 5**, the combined method of Brooks and Sekiguchi discloses a majority of the features of claim 5, as discussed above in claims 1 and 4, but does not explicitly disclose that the step of increasing video quality comprises determining the maximum frame rate in accordance with the following expression:

$MaxFrameRate = \frac{1}{\frac{N_{coded}}{MaxMBPS} + \frac{N_{skipped}}{MaxSKIPPED}}$ where N_{coded} is the number of coded macroblocks per frame, $N_{skipped}$ is the number of skipped macroblocks per frame, MaxMBPS is the maximum number of macroblocks that can be decoded in a given interval, and MaxSKIPPED is the maximum number of macroblocks that can be decoded in a given interval if all macroblocks are skipped. However, The Examiner takes Official Notice that one of ordinary skill in the art at the time of the invention would have found it obvious to increase the frame rate of the video stream when less macroblocks are encoded in order to maintain a constant bitrate by transmitting more frames when less data is present in each frame.

Re **claim 6**, the combined method of Brooks and Sekiguchi discloses that the step of increasing video quality comprises increasing a video frame rate (Brooks: Fig. 6A, element 890).

Re **claim 7**, the combined method of Brooks and Sekiguchi discloses that the step of increasing video quality comprises increasing a video picture size (Brooks: Fig. 6A, element 860).

Re **claim 8**, the combined method of Brooks and Sekiguchi discloses a majority of the features of claim 8, as discussed above in claim 1. Additionally, Brooks discloses that the step of increasing video quality further comprises increasing a video frame rate (Brooks: Fig. 6A, element 890) as a function of a computational cost of the decoder to decode the macroblocks (Brooks: column 3, lines 15-21). Brooks does not explicitly state that various types of macroblocks are decoded. However, Sekiguchi discloses a video data conversion device and method, wherein macroblocks conform to one of several coding modes

(Sekiguchi: paragraph [0129], intra, skip, and inter modes) and the coding mode is selected based on a cost function (Sekiguchi: Fig. 7; paragraphs [0127]-[0130]). Since both Brooks and Sekiguchi relate to manipulating video data to meet output stream constraints, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the video data conversion of Sekiguchi with the quality manipulation of Brooks in order to provide a more robust encoder, which can hold up to the change in data used for motion estimation, which results from the change in resolution (Sekiguchi: paragraph [0010]).

Re **claim 9**, the combined method of Brooks and Sekiguchi discloses a majority of the features of claim 9, as discussed above in claim 1. Additionally, Brooks discloses that the step of increasing video quality further comprises increasing a video picture size (Brooks: Fig. 6A, element 860) as a function of a computational cost of the decoder to decode the macroblocks (Brooks: column 3, lines 15-21). Brooks does not explicitly state that various types of macroblocks are decoded. However, Sekiguchi discloses a video data conversion device and method, wherein macroblocks conform to one of several coding modes (Sekiguchi: paragraph [0129], intra, skip, and inter modes) and the coding mode is selected based on a cost function (Sekiguchi: Fig. 7; paragraphs [0127]-[0130]). Since both Brooks and Sekiguchi relate to manipulating video data to meet output stream constraints, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the video data conversion of Sekiguchi with the quality manipulation of Brooks in order to provide a more robust encoder, which can hold up to the change in data used for motion estimation, which results from the change in resolution (Sekiguchi: paragraph [0010]).

Re **claim 10**, the combined method of Brooks and Sekiguchi discloses taking account of a number of coefficients included in the encoded macroblocks and a computational requirement of the decoder as a function of this number (Brooks: Fig. 6B, element 900; column 13, lines 57-64, varying the quantization scale changes the number of coefficients).

Claim 11 has been analyzed and rejected with respect to claim 6 above.

Claim 12 has been analyzed and rejected with respect to claim 7 above.

Claim 13 has been analyzed and rejected with respect to claim 8 above.

Claim 14 has been analyzed and rejected with respect to claim 9 above.

Re **claim 15**, Brooks discloses a method for manipulating video streams, which may be used in a video conferencing terminal (Brooks: column 3, lines 8-9, video streams are transformed) adapted to produce encoded video including a sequence of encoded frames, each encoded frame comprising one or more encoded macroblocks (Brooks: Fig. 6B, element 930; the data is encoded), the video conferencing terminal comprising: one or more image processing engines adapted to encode a video signal (Brooks: Fig. 4, encoder 560), and a communication interface adapted to determine one or more processing capabilities of a decoder that will decode the encoded video and further adapted to adjust video quality (Brooks: Figs. 6A and 6B; column 10, lines 1-15).

Brooks does not specifically disclose that some macroblocks are skipped and that video quality is adjusted to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks. However, Sekiguchi discloses a video data conversion method, where some macroblocks are skipped in the encoding process (Sekiguchi: Fig. 2, element ST0) and the coding mode is determined by analyzing a cost function if the frame is a mix of skipped blocks and non-skipped blocks (Sekiguchi: Fig. 7, coding mode estimator 8; paragraphs [0127]-[0130]). Since both Brooks and Sekiguchi relate to manipulating video data to meet output stream constraints, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the video data conversion of Sekiguchi with the quality manipulation of Brooks in order to provide a more robust encoder, which can hold up to the change in data used for motion estimation, which results from the change in resolution (Sekiguchi: paragraph [0010]). The combined method of Brooks and Sekiguchi has all of the features of claim 15.

Claim 16 has been analyzed and rejected with respect to claim 4 above.

Claim 17 has been analyzed and rejected with respect to claim 5 above.

Claim 18 has been analyzed and rejected with respect to claim 6 above.

Claim 19 has been analyzed and rejected with respect to claim 7 above.

Claim 20 has been analyzed and rejected with respect to claim 8 above.

Claim 21 has been analyzed and rejected with respect to claim 9 above.

Claim 28 has been analyzed and rejected with respect to claim 4 above.

Claim 29 has been analyzed and rejected with respect to claim 5 above.

Claim 32 has been analyzed and rejected with respect to claim 8 above.

Claim 33 has been analyzed and rejected with respect to claim 9 above.

(10) Response to Argument

A. Claims 22-27 and 30-31 Are Not Anticipated By Brooks

Re claims 22 and 27, the Applicant contends that the prior art cited (Brooks) fails to teach or suggest determining one or more processing capabilities of a decoder that will decode the video sequence; and increasing video quality as a function of an encoder model of decoder processing load to take advantage of decoder processing capability that would otherwise be unused. However, the Examiner respectfully disagrees.

According to the Applicant's specification, as recited in the present applications corresponding pre-grant publication US 2005/0201469 A1, the Applicant discloses that the bitstream constraints of the encoded bitstream “may be specified by providing the encoder with prior knowledge of the limitations of prospective decoders (for example from a published specification), or by the transmission of a set of one or more parameters from the decoder to the encoder, which directly or indirectly signal the decoder's capability.” (Applicant's PG Pub US 2005/0201469 A1: last sentence of paragraph [0012]) The Applicant goes on to claim, in claims 22 and 27, determining one or more processing capabilities of a decoder that will decode a video sequence and increasing video quality as a function of an encoder model of decoder processor load to take advantage of decoder processing capability that would otherwise be unused. In view of the Applicant's specification, the Examiner interprets such claim language to mean that the processing capabilities of the decoder may be either stored or received by the encoder, and the bandwidth and encoding parameters may be adjusted to maximize use of available bandwidth in accordance with the capabilities of the device receiving/decoding the transmitted/streamed content.

Brooks illustrates (in Brooks: Fig. 1) a usage scenario of a streaming network, where different modem bandwidth capabilities in conjunction with desired frame rate and resolution are shown for several devices connected to a network gateway (Brooks: Fig. 1 and column 6, line 35-column 7, line 22). More specifically, the gateway computer is configured to receive video data from a computer system and to provide video data to each device according to that device's bandwidth limitations, and in the output format desired (Brooke: column 7, lines 11-14). Accordingly, Brooks discloses a system for transforming streaming video data, wherein the data associated with an output video data is typically derived from the requesting device (Brooks: column 10, lines 1-2) and the requesting device informs the gateway system as to the bandwidth requirements, which may include maximum frame rate, color-depth, screen resolution or spatial bandwidth, maximum bit rate, and the like (Brooks: column 10, lines 4-11).

An example is given by Brooks, wherein the color bit depth is scaled. In this example if the input color depth is 8 bits and the desired output bit depth is 10 bits, the input frame bit depth may be scaled up (Brooks: column 17, lines 50-62). Applying this example to the scenario of the present application, if the system of Brooks inputs a picture that uses 8 bits to represent the color component, but the decoder on the other end of the network uses 10 bits to represent the color signal, the 8 bits are scaled up to 10 bits. Therefore, the example shows a process of tailoring the bitstream to the capabilities of the decoder processor.

Brooks carries this concept over to several parameters by showing that color depth, resolution, frame rate, and bit rate may all be adjusted in such a manner of determining the desired output and scaling the inputted signal accordingly (Brooks: Figs. 6A and 6B), thus meeting the limitations presented in claims 22 and 27.

B. Claims 1-21, 28-29, and 32-33 Are Not Obvious Over Brooks In View Of Sekiguchi

Re claims 1 and 15, the Applicant contends that the prior art cited (Brooks in view of Sekiguchi) fails to teach or suggest “determining one or more processing capabilities of a decoder...” and “increasing video quality as a function of macroblocks that are skipped to take advantage of decoder processing

capability that would otherwise be unused as a result of the skipped macroblocks." However, the Examiner respectfully disagrees.

As explained above in section A of the Response to Arguments, Brooks illustrates (in Brooks: Fig. 1) a usage scenario of a streaming network, where different modem bandwidth capabilities in conjunction with desired frame rate and resolution are shown for several devices connected to a network gateway (Brooks: Fig. 1 and column 6, line 35-column 7, line 22). More specifically, the gateway computer is configured to receive video data from a computer system and to provide video data to each device according to that device's bandwidth limitations, and in the output format desired (Brooke: column 7, lines 11-14). Accordingly, Brooks discloses a system for transforming streaming video data, wherein the data associated with an output video data is typically derived from the requesting device (Brooks: column 10, lines 1-2) and the requesting device informs the gateway system as to the bandwidth requirements, which may include maximum frame rate, color-depth, screen resolution or spatial bandwidth, maximum bit rate, and the like (Brooks: column 10, lines 4-11), thus meeting the claimed limitation of determining one or more processing capabilities of a decoder.

With respect to increasing video quality as a function of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks, Brooks discloses adjusting the quantization scale to meet an optimized target bit rate (Brooks: column 13, lines 57-64), but Brooks does not specifically disclose adjusting video quality as a function of macroblocks that are skipped in order to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks. However, Sekiguchi discloses a video data conversion device and method, wherein a coding mode estimator chooses a coding mode based on whether some data is intra data (intra mode), all data is skipped (skip mode), or any other combination of data (mode selected on a cost basis) (Sekiguchi: Fig. 7). Sekiguchi further explains, with reference to Fig. 7, that if all four macroblocks are in intra mode, then the coding mode is forcedly made intra (Sekiguchi: paragraph [0127]); if all four macroblocks are skip mode, then the coding mode is forcedly made skip (Sekiguchi: paragraph [0128]); but if an occasion other than skip takes place just once, then the possibility of inter mode is checked (Sekiguchi: paragraph [0128]). Accordingly, the coding

mode includes three possible choices: forced intra mode, forced skip mode, and inter mode (Sekiguchi: paragraph [0129] and Fig. 2, step ST0). As a result, only when a decision is made that the possibility of the inter mode must be checked, the optimum mode in terms of the coding efficiency is re-decided among the possible coding modes (Sekiguchi: paragraph [0130]), and the mode with the highest coding efficiency is selected (Sekiguchi: paragraph [0140]). Therefore, coding optimization is a function of the presence of a fractional presence of skip macroblocks in an inter frame, since coding optimization is not performed for the modes without a fractional presence of skip macroblocks.

Sekiguchi also discloses that the decision process of the quantization step parameter (Qp) may be closely combined with the coding mode selection (corresponding to section (3) of Sekiguchi) in order to further improve the coding efficiency (Sekiguchi: paragraph [0108]). Since both Brooks (Brooks: column 13, lines 57-64) and Sekiguchi (Sekiguchi: paragraph [0108]) disclose setting a quantization parameter in order to optimize efficiency, one of ordinary skill in the art at the time of the invention would have found a combination of the references obvious.

The Applicant states on page 8, lines 15-18, of the Appeal Brief filed 2/09/2009 that "Applicants' specification teaches various examples of 'increasing video quality' such as increasing frame rate and picture size" and that "other ways to increase the video quality are also contemplated, such as a finer degree of quantization, etc." Therefore, in view of the response provided above, the combination of Brooks in view of Sekiguchi meets the limitation of increasing video quality as a function of macroblocks that are skipped to take advantage of decoder processing capability that would otherwise be unused as a result of the skipped macroblocks, as recited in claims 1 and 15.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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May 11, 2009